BK Precision
MN# 2120

Calibration Procedure

MP MASTER
MA34938

SE Laboratories
LOC: CC1
MAN – 05330

CALIBRATION PROCEDURE

MODEL 2120
20 MHz
OSCILLOSCOPE

1993 and later version
(with CH1 and CH2 PULL X5 controls)

B&K PRECISION®

494-256-9-001

WARNING

The following instructions are for use by qualified service personnel only. To avoid electrical shock, do not perform servicing unless qualified to do so.

High voltage up to 2,000 volts is present when covers are removed and the unit is operating. Remember that high voltage may be retained indefinitely on high voltage capacitors. Also remember that ac line voltage is present on line voltage input circuits (including the fuse holder, line cord receptacle, and POWER switch) any time the instrument is plugged into an ac outlet, even if turned off. Unplug the oscilloscope and discharge high voltage capacitors before performing service procedures unless it is necessary to have the unit powered up.

The unit was carefully checked and calibrated at the factory prior to shipment. Readjustment is recommended only if repairs have been made in a circuit affecting calibration. The location of the calibration adjustments is shown in Fig. 1 and Fig. 2. Keep in mind that some calibration adjustments require high precision test instruments. Those adjustments should be attempted only if the proper test equipment is available and you are experienced in its use. Before making adjustments, allow 30 minutes warm-up time (with the case on and Adjust all front panel controls (INTENSITY, FOCUS, TRACE ROTATION, POS, etc.) to optimum positions. The following test equipment is required for complete calibration:

Oscilloscope Calibrator with vertical and timebase accuracy of ±0.3% or better.

Multimeter with DCV accuracy of 0.25% or better, **B+K Precision** Model 389 or equivalent.

High Voltage Probe capable of measuring at least 2 kV, **B+K Precision** Model PR-28 or equivalent.

Variable AC Power Supply capable of varying line voltage input 120 Vac ±10%, at least 35 Watts, **B+K Precision** Model 1653 or equivalent.

All voltage measurements are to be taken with respect to chassis ground unless otherwise noted.

POWER SUPPLY ADJUSTMENTS

1. Plug the oscilloscope into a variable AC power supply and set the variable AC power supply output to exactly 120 V.
2. Check the following power supply voltages with the multimeter:

   Check TP +5V for 5V±0.2V

   Check TP +12V for 12V±0.5V

   Check TP +24V for 24V±1.0V

   Check TP −12V for −12V±0.5V
3. Connect the multimeter to TP+140V.
4. If necessary, adjust VR501 for a +140 Vdc ±1 Vdc reading on the multimeter.
5. Connect the multimeter to TP+260V.
6. If necessary readjust VR501 for a +260 Vdc ±5 Vdc reading on the multimeter.
7. Repeat steps two through five until the +140V and +260V are both within the specified tolerance.
8. Measure the voltage at TP −2kV with a high voltage probe.
9. If necessary, adjust VR508 for a meter reading of −2000 Vdc ±5 Vdc.
10. Vary the voltage of the variable AC power supply from 108 Vac to 132 Vac while measuring test point TP −2kV. The voltage should remain within 2000 Vdc±5V.
11. Disconnect the oscilloscope from the variable ac power supply and plug it into a regular ac outlet.

INTENSITY ADJUSTMENT

1. Set up the oscilloscope for automatic (AUTO) sweep operation with a single-trace displayed at the center of the CRT.
2. Set FOCUS to center position and TIME/DIV to 1 mSEC/DIV.
3. Rotate INTENSITY fully clockwise.
4. Adjust VR504 for a very bright trace that does not blossom.
5. Set the INTENSITY control fully counterclockwise.
6. Adjust VR505 until the trace just disappears.

ASTIGMATISM ADJUSTMENT

1. Set up the oscilloscope for X-Y operation (with no input signals) and set the FOCUS and INTENSITY controls to mid-range.
2. Select X-Y operation, and Adjust X-POS until the point is centered.

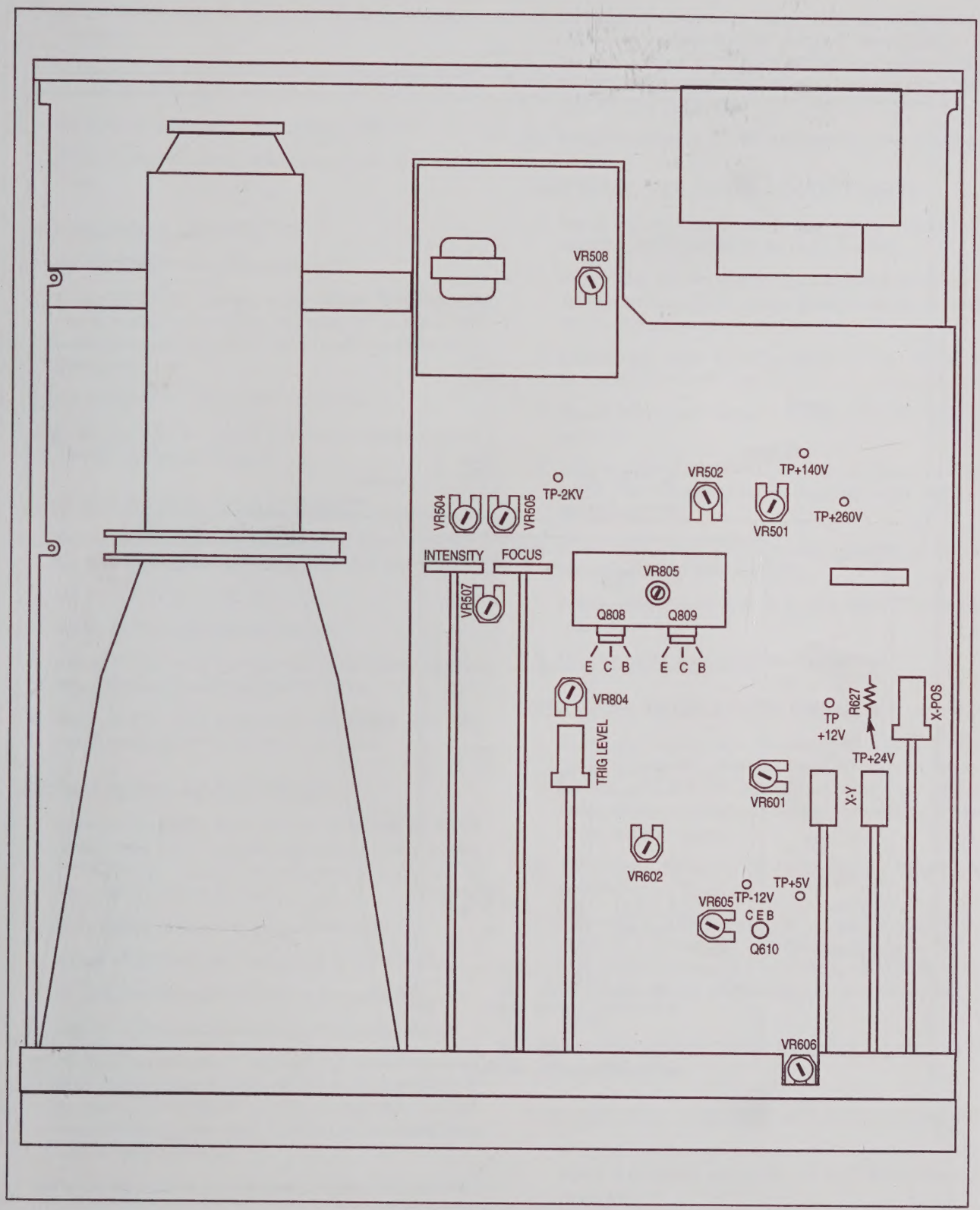


Fig. 1. Adjustment Locations (Top View).

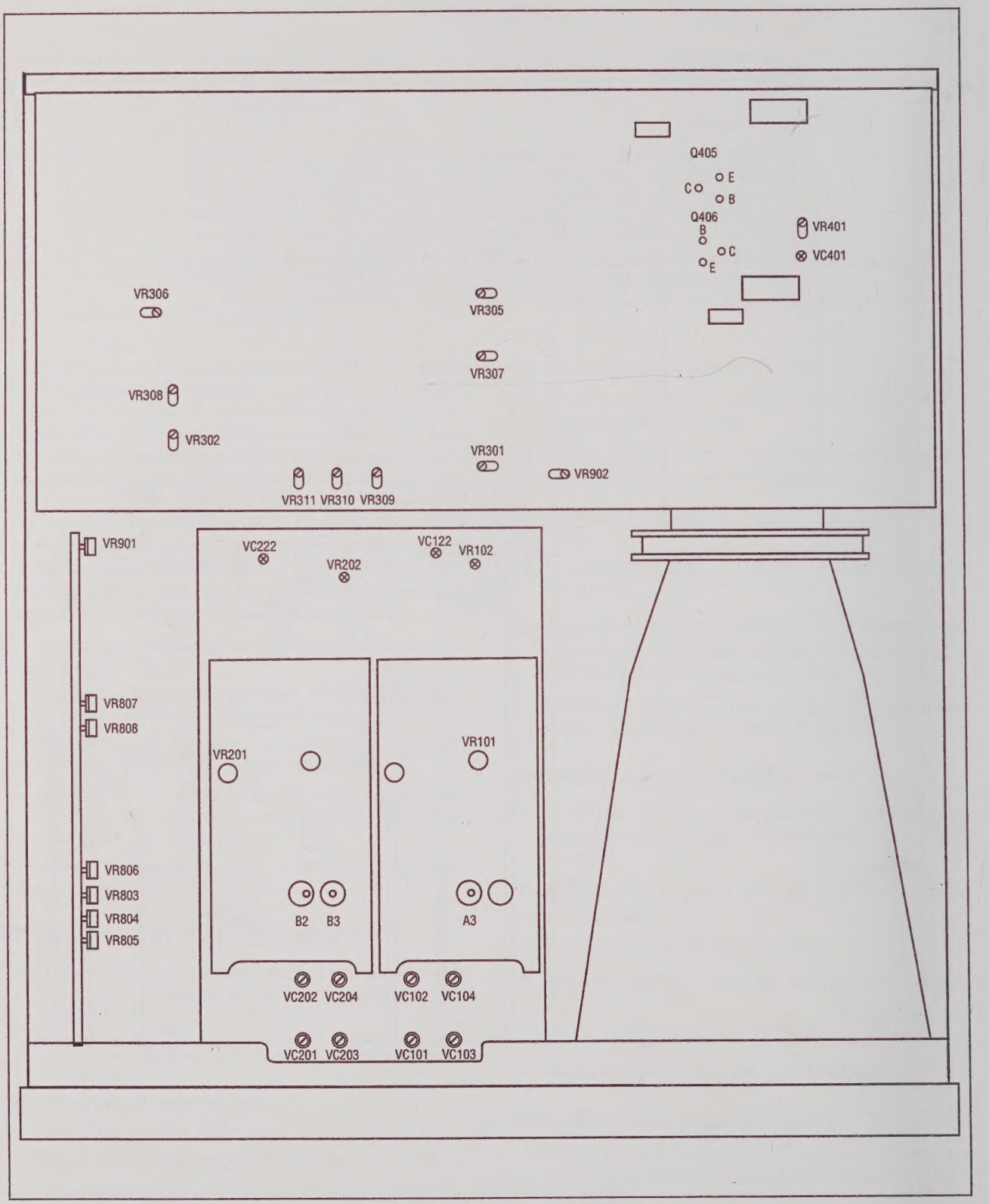


Fig. 2. Adjustment Locations (Bottom View).

3. Adjust VR507 until the spot is as small and round as possible.
4. Rotate FOCUS through full range. The change in the display should be symmetrical.
5. Set FOCUS so that the trace is sharply defined.
6. Return to normal sweep operation (disable X-Y operation).

BLANKING ADJUSTMENT

1. Set INTENSITY fully clockwise.
2. Rotate TIME/DIV through every setting. There should not be a bright point at the beginning of the trace. If a bright point appears, adjust VR502 until the bright point disappears.
3. Set INTENSITY fully counter-clockwise.
4. Check the trace for breaks. If there are breaks readjust VR502 until breaks disappear.

SWEEP LENGTH ADJUSTMENT

1. Set the oscilloscope for a single-trace display of channel 1 (with the channel 1 AC-GND-DC switch set to GND).
2. Set TIME/DIV to the 50 uS.
2. Rotate X-POS fully counterclockwise.
3. Adjust VR605 until the right end of the trace falls between the second and third graticule lines.
4. Rotate X-POS until trace covers the display. The total sweep length should be about 12 divisions.

DC BALANCE ADJUSTMENT

1. With the channel 1 AC-GND-DC switch in the GND position, the AUTO trigger mode selected, and channel 1 singe-trace operation selected, set the CH 1 VOLTS/DIV switch to 5 mV.
2. Use a digital voltmeter to measure test point A3.
3. Adjust VR101 until the reading is 0.00 mV±0 mV.
4. Use a digital voltmeter to measure test point B3.
5. Adjust VR201 until the reading is 0.00 mV±0 mV.
6. Rotating the channel 1 VAR control should cause no more than 1 minor division change in trace position. If necessary, adjust VR102 and VR301 until trace shift is 1 minor division or less when VAR control is rotated from CAL to fully clockwise.
7. Return the channel 1 VAR control to the CAL position.
8. Set channel 2 AC-GND-DC switch to the GND position, select the AUTO trigger mode, select channel 2 singe-trace operation, and set the CH 2 VOLTS/DIV switch to 5 m V.
9. Rotating the channel 2 VAR control should cause no more than 1 minor division change in trace position. If necessary, adjust VR202 and VR302 until trace shift is 1 minor division or less when VAR control is rotated from CAL to fully clockwise.
10. Return the channel 2 VAR control to the CAL position.

VERTICAL VOLTAGE ADJUSTMENT

1. Set up the oscilloscope for X-Y operation and set both AC-GND-DC switches to the GND position.
2. Be sure that all four vertical mode switches are released and use the channel 1 POS and X POS controls to set the dot to the exact center of the CRT.
3. If necessary, adjust VR305 to obtain 95 Vdc ±2 Vdc at the collectors of Q405 and Q406.
4. Repeat steps 2 and 3 until no further ADJUSTMENT is required.
5. Press the CH 1/CH 2 switch and use the channel 2 POS and X POS controls to set the dot at the exact center of the CRT.
6. If necessary, adjust VR306 to obtain 95 Vdc ±2 Vdc at the collectors of Q405 and Q406.
7. Repeat steps 5 and 6 until no further ADJUSTMENT is required.
8. Disconnect the meter from the oscilloscope.

VERTICAL GAIN ADJUSTMENT

1. Using the oscilloscope calibrator, connect a 1 kHz, 30 mV p-p square wave to the channel 1 input and set the oscilloscope CH 1 VOLTS/DIV control to 5 mV. Adjust the oscilloscope for a stable display of about three cycles of the channel 1 signal.
2. If necessary, adjust VR307 for exactly six divisions of amplitude.
3. Connect the calibrator (still set at 30 mV p-p) to the channel 2 input and set the oscilloscope CH 2 VOLTS/DIV control to 5 mV. Adjust the oscilloscope for a stable display of about three cycles of the channel 2 signal.
4. If necessary, adjust VR308 for exactly six divisions of amplitute.

HORIZONTAL CENTERING ADJUSTMENT

1. With the oscilloscope set up for X-Y operation and the PULL X10 control pushed in, set the X POS control to its center.
2. If necessary, adjust VR606 until the dot is horizontally centered on the CRT.

HORIZONTAL VOLTAGE ADJUSTMENT

1. With the oscilloscope still set up for X-Y operation and the PULL X10 control pushed in, set the position controls so that the dot is at the exact center of the CRT.
2. If necessary, adjust VR804 (top board) to obtain 145 Vdc ±5 Vdc at the collectors of Q808 and Q809.
3. Disconnect the meter from the oscilloscope.

TIMEBASE ACCURACY ADJUSTMENT

1. Set the oscilloscope calibrator for time base markers and connect it to the oscilloscope channel 1 input.
2. For each of the following ADJUSTMENT steps set the oscilloscope TIME/DIV and oscilloscope calibrator to the same position. Be sure the TIME/DIV VAR is set to CAL.
3. 5 µS: Adjust VR803 to −1.0% error.
4. 10 µS: Adjust VR807 to −1.0% error.
5. 20 µS: Adjust VR808 to −1.0% error.
6. 0.5 mS: Adjust VR804 to −1.0% error.
7. 50 mS: Adjust VR805 to 0% error.
8. 0.5 µS: Adjust VR806 to +0.5% error.
9. Check that all TIME/DIV positions are within +1% to −2% error.

X10 MAGNIFICATION ADJUSTMENT

1. Set the oscilloscope calibrator for a 5 µS markers and connect it to the oscilloscope channel 1 input. Set the oscilloscope TIME/DIV control to 50 µS.
2. Pull out the PULL X10 control.
3. Adjust the X POS control so that the first marker falls on the left most vertical graduation.
4. If necessary, adjust VR 805 (top board) for calibration on the 10 markers.

X GAIN ADJUSTMENT

1. Set up the oscilloscope for X-Y operation and apply a 1 kHz, 30 mV signal (from the oscilloscope calibrator) to the oscilloscope's channel 2 (X) input. Set the CH 2 VOLTS/DIV control to 5 mV.
2. If necessary, adjust VR311 so that the signal provides exactly 6 divisions of horizontal deflection.

TRIGGER ADJUSTMENT

1. Apply a 1 kHz, 0.5 V p-p sinewave to the channel 1 input of the oscilloscope and set the CH 1 VOLTS/DIV control to 0.1 V.
2. Adjust the CH 1 POS control so that the five divisions of waveform are centered vertically (the waveform should extend just beyond the 10 and 90% graticule markings).
3. Adjust the TRIG LEVEL control so that the waveform crosses the center horizontal graduation at the leftmost graduation (as shown in Fig. 3).

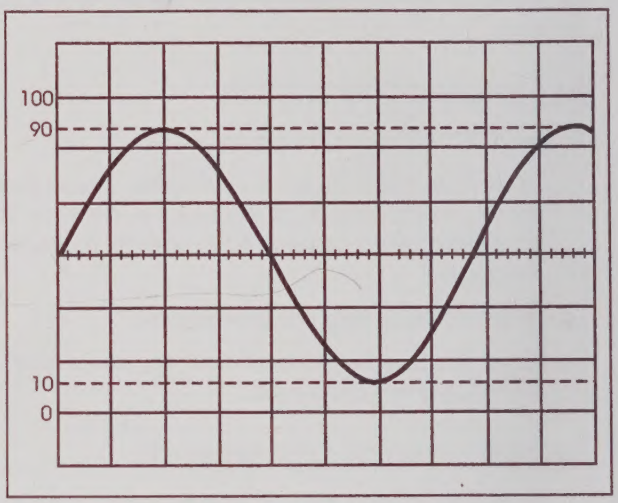


Fig. 3. Adjusting Trigger Point.

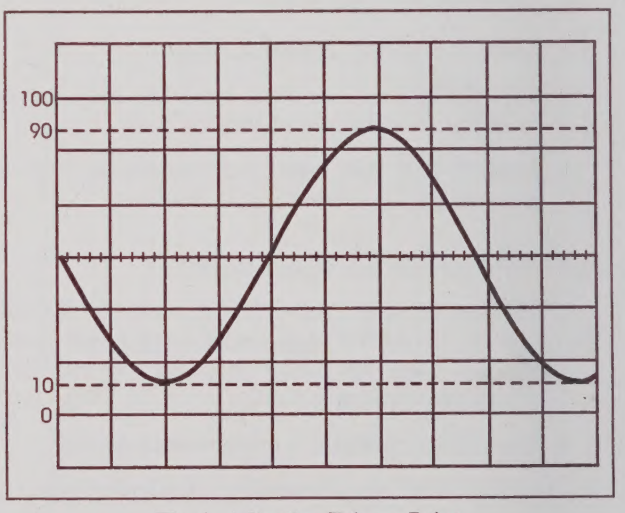


Fig. 4. Adjusting Trigger Point.

4. Using the SLOPE switch alternately select + and − slope and observe the waveform.
5. If necessary, adjust VR601 so that the trigger point is symmetrical for + or − slope.
6. Pull out the TRIG LEVEL/PUSH AUTO control. (Select NORM trigger mode).
7. Adjust the TRIG LEVEL control to obtain a triggered display.
8. Progressively reduce the 1 kHz sinewave signal while Adjusting the TRIG LEVEL control to the lowest level where triggering can be achieved.

9. Adjust VR 602 while repeating step 8 to achieve triggering at the lowest signal level.
10. Remove the input signal, set both AC-GND-DC switches to GND, and push in the TRIG LEVEL/PUSH AUTO control.
11. With the oscilloscope set for channel 1 single-trace operation, use the CH 1 POS control to set the waveform at the vertical center of the display.
12. Connect the multimeter to the emitter of Q610 and if necessary, adjust VR309 for a reading of 0 Vdc ±10 mVdc on the multimeter.
13. Disconnect the multimeter from the oscilloscope.

ATTENTUATOR COMPENSATION ADJUSTMENTS

1. Using the input circuit shown in Fig. 5, connect an oscilloscope calibrator to the channel 1 input. Set the calibrator for a 1 kHz square wave at 50 mV p-p and set the oscilloscope **CH1 VOLTS/DIV** control to **5 mV**. Adjust the oscilloscope controls for a stable display of about three cycles of the channel 1 signal.

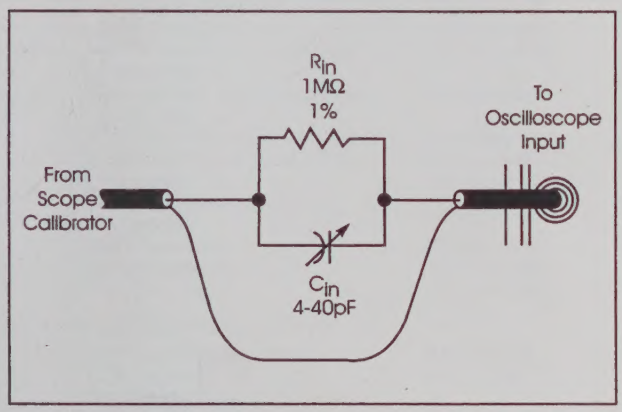


Fig. 5. Network for Input Attenuator Adjustment.

2. Adjust Cin (in the input circuit shown in Fig. 5) for optimum wave shape as shown in Fig. 6.

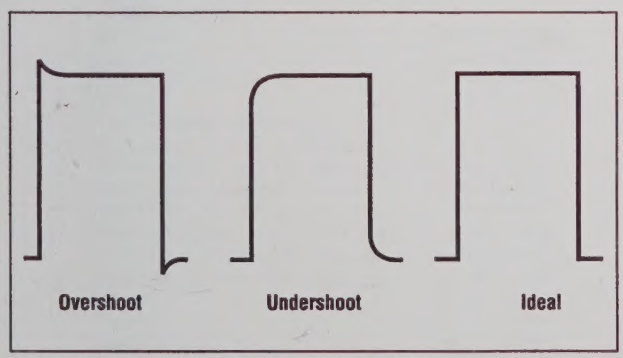


Fig. 6. Adjusting 1 kHz Square Wave Characteristics.

3. Use the following table as a guide for setting the attentuator compensation.

CALIBRATOR INPUT LEVEL	OSCILLOSCOPE RANGE	TRIMMER
1 V	0.1 V/Div	VC101 and VC102
10 V	1 V/Div	VC103 and VC104

4. Again using the input circuit shown in Fig. 5, connect an oscilloscope calibrator to the channel 2 input. Set the calibrator for a 1 kHz square wave at 50 mV and set the oscilloscope **CH2 VOLTS/DIV** control to **5 mV**. Adjust the oscilloscope controls for a stable display of about three cycles of the channel 2 signal.
5. Adjust Cin (in the input circuit shown in Fig. 5) for optimum wave shape as shown in Fig. 6.
6. Use the following table as a guide for setting the attenuator compensation.

CALIBRATOR INPUT LEVEL	OSCILLOSCOPE RANGE	TRIMMER
1 V	0.1 V/Div	VC201 and VC202
10 V	1 V/Div	VC203 and VC204

BANDWIDTH ADJUSTMENT

1. Apply a 1 MHz, 20 mV p-p square wave to the oscilloscope's channel 1 input and set the oscilloscope CH 1 VOLTS/DIV control to 5 mV. Adjust the oscilloscope for a stable display of about three cycles of the channel 1 signal and center the waveform so that it goes two divisions above and two divisions below the center horizontal graduation.
2. Adjust VR401, VC401, and VC122 for optimum flatness of the squarewave (minimum ringing and overshoot).
3. Apply a 1 MHz, 20 mV p-p square wave to the oscilloscope's channel 2 input and set the oscilloscope CH 2 VOLTS/DIV control to 5 mV. Adjust the oscilloscope for a stable display of about three cycles of the channel 1 signal and center the waveform so that it goes two divisions above and two divisions below the center horizontal graduation.
4. Adjust VC222 for optimum flatness of the squarewave (minimum ringing and overshoot).

CH 1 OUTPUT DC OFFSET ADJUSTMENT

1. Select DUAL trace operation.
2. Set CH1 and CH2 AC-GND-DC switches to GND.
3. Using CH1 POS and CH2 POS controls, adjust both traces to the exact center of the display.
4. Connect a cable from the CH1 output jack on rear of scope to CH2 input on front of scope.
5. Set CH2 AC-GND-DC switch to DC.

6. If necessary, adjust VR902 so the channel 2 trace returns to the exact center of the display.

CAL 0.2 V P-P OUTPUT ADJUSTMENT

1. Connect the oscilloscope calibrator to the channel 1 input of the oscilloscope and set the calibrator for a 0.2 V p-p output. Adjust the oscilloscope controls to obtain a stable display of about three cycles of the channel 1 signal.
2. Use the oscilloscope's channel 1 VAR control to Adjust the waveform so that it occupies exactly six vertical divisions of display.
3. Disconnect the calibrator from the oscilloscope and connect the CAL 0.2 V p-p terminal to the channel 1 input. Be sure not to disturb the channel 1 VAR control setting.
4. If necessary, adjust VR901 so that the CAL 0.2 V p-p signal occupies exactly six vertical divisions of display.

SERVICING INFORMATION

B+K PRECISION

MODEL 2120

(1993 version)

20-MHz DUAL TRACE OSCILLOSCOPE

PARTS LIST

CUIT BOL	DESCRIPTION	B+K PRECISION PART NUMBER
	MAIN CHASSIS ASSEMBLY (538-047-0-000)	
	ELECTRICAL PARTS	
, 201	51Ω, 5%, 1/2 W, Carbon Film Resistor	002-102-5-510
	Trace Rotation Coil	047-101-9-001
	Power Transformer	065-226-9-001
	Power Switch, Push Button Type	088-173-9-001
03, 304	500 Ω Potentiometer	088-866-9-001
301	LED, Red	158-094-9-001
	BD237 NPN Transistor	176-214-9-002
	BUX86 NPN Transistor	176-214-9-007
V, Operation)	Fuse, 315 mA, 250 V, 5x20 mm Normal Blow	194-048-9-001
V, Operation)	Fuse, 630 mA, 250 V, 5 x 20 mm Normal Blow	194-049-9-001
	150BTB31A Cathode Ray Tube	230-038-9-001
	Detachable Power Cord, 3-Wire	420-042-9-001
	CRT Socket	749-120-9-002
	AC Fuse Holder/Power Input Receptacle	770-030-9-001
	BNC Connector	772-054-9-001
	Banana Jack, Black	773-140-9-001
	Test Pin	777-079-9-001
	MECHANICAL PARTS	
	CRT Angle Bracket, Bottom	250-253-9-001
	CRT Angle Bracket, Top	250-253-9-002
	Bracket, CH1/CH2 POS Controls	250-254-9-002
	Bracket, Power Switch	250-256-9-002
	Side Frame, Right	254-121-9-002
	Side Frame, Left	254-122-9-002
	Front Sub-panel	254-123-9-003
	Rear Sub-panel	254-124-9-002
	Center Frame	254-133-9-004
	Bracket, Timebase & Vert Attn PCB Mounting	254-152-9-001
	CRT Shield	256-268-9-003
	Logo Overlay	260-468-9-002
	Control Overlay	260-480-9-004
	Tilt Stand	261-210-9-001
Xfrmr	Transformer Mounting Plate	261-211-9-001
e/X-Y	Metal Link, 2.5 mm x 75 mm Long	265-049-9-001
	Plastic Shaft, 6 mm x 135 mm Long	265-049-9-005
	Plastic Shaft, 6 mm x 55 mm Long	265-049-9-006
	Plastic Shaft, 6 mm x 80 mm Long	265-049-9-007
Mode	Metal Link, 2.5 mm x 270 mm Long	265-049-9-009
n-Invert	Metal Link, 2.5 mm x 200 mm Long	265-049-9-010
er Sw.	Metal Link, 2.5 mm x 190 mm Long	265-052-9-001
	Cabinet	272-197-9-003
503, 511	Insulator	342-191-9-001
	Cable Tie	380-311-9-001
	Wire Tie	380-529-9-001
	Wire Tie	380-529-9-001
	Switch Coupler, Plastic	380-567-9-001
	Front Panel	380-585-9-001

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
	Rear Panel	380-582-9-002
	CRT Bezel	380-582-9-003
	Leg, Tilt Stand	380-585-9-002
	Switch Coupler, Plastic	380-585-9-003
	Pot. Coupler, Plastic	380-585-9-005
(For LED801)	Grommet (LED Cushion)	381-190-9-001
	Lever Switch Handle, Grey	384-106-9-001
	Push Button, Grey	384-106-9-003
	Lever Switch Handle, Grey	384-119-9-001
	Push Button, Red	384-136-9-001
	Cushion, Top CRT Angle Bracket	388-114-9-002
	Cushion, Bottom CRT Angle Bracket	388-114-9-003
1 Top, 1 Bottom	Cushion, CRT Bracket	388-114-9-004
	Cushion, Bottom Bracket	388-114-9-006
	Cushion, Top Bracket Front	388-114-9-007
	Cushion, CRT Neck	388-122-9-001
	Power Switch Link Cushion	388-122-9-002
	Instruction Manual	480-537-9-001
	Label, Silver Color Model Number	483-680-9-008
	Label, Line Voltage on Fuse Holder	483-835-9-001
	Label, Calibration Adjustments	483-835-9-002
for Q511	M3 x 6 mm Screw	634-228-9-001
	M3 x 6 mm Screw	634-228-9-001
for Q503	M3 x 6 mm Screw	634-228-9-001
	M3 x 6 mm Screw	634-228-9-001
	M3 x 12 mm Screw	634-228-9-004
4 for Xfrmr	M4 x 10 mm Screw	634-228-9-006
	M3 x 18 mm Screw	634-228-9-009
	M3 x 8 mm Screw	634-228-9-011
	M3 x 8 mm Screw, (Black)	634-228-9-012
	M3 x 6 mm Screw	634-228-9-013
	M4 x 8 mm Type S Screw	634-253-9-004
for Handle	M4 x 6 mm Screw	634-282-9-001
	4 x 3.2 mm Hex Nut	653-127-9-001
	M3 x 8 mm Type B Screw	710-161-9-002
	M3 x 6 mm Type B Screw	710-161-9-003
for Legs	3 x 10 mm Screw	710-174-9-001
	M3.2 x 8 mm Washer	724-092-9-001
	5.2 x 12 mm Washer	724-092-9-003
4 for Xfrmr	M4 x 10 mm Spring Lockwasher	724-092-9-005
for Handle	M4.2 x 10 mm Washer	724-092-9-006
	M4 x 15 mm Toothed Lockwasher	731-115-9-001
	Rivet	733-047-9-001
	Handle	746-084-9-002
	Large Knob, Grey	751-334-9-001
	Small Knob, Grey	751-334-9-005
	Small Knob, Grey	751-344-9-001
	Small Knob	751-362-9-001
	Large Knob	751-362-9-002
	Small Knob, Grey	751-362-9-003
	Graticule	753-049-9-001
	Stand Off	759-229-9-002

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER

ATTENUATOR & VERTICAL PRE-AMPLIFIER (546-065-9-002)

RESISTORS

R112, 212	1 M, Ω, 5%, 1/2 W, Carbon Film	002-102-5-105
R113, 213	470 kΩ, 5%, 1/2 W, Carbon Film	002-102-5-474
R114, 214	1 kΩ, 5%, 1/4 W, Metal Film	011-104-5-102
R116, 118, 216, 218	680 Ω, 5%, 1/4 W, Metal Film	011-104-5-681
R117, 132, 217, 232, 234	100 Ω, 5%, 1/4 W, Metal Film	011-104-5-101
R119, 219	8.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-822
R120, 220	3.9 kΩ, 5%, 1/4 W, Metal Film	011-104-5-392
R121, 221	390 Ω, 5%, 1/4 W, Metal Film	011-104-5-391
R122, 222	5.6 kΩ, 5%, 1/4 W, Metal Film	011-104-5-562
R123, 125, 223, 225	51 Ω, 5%, 1/4 W, Metal Film	011-104-5-510
R124, 224	1.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-122
R126, 137, 226, 237	6.8 Ω, 5%, 1/4 W, Metal Film	011-104-5-689
R127, 130, 227, 230	150 Ω, 5%, 1/4 W, Metal Film	011-104-5-151
R128, 228	120 Ω, 5%, 1/4 W, Metal Film	011-104-5-121
R129, 229	22 Ω, 5%, 1/4 W, Metal Film	011-104-5-220
R131, 231	22 kΩ, 5%, 1/4 W, Metal Film	011-104-5-223
R133, 233	2.21 kΩ, 1%, 1/4 W, Metal Film	015-144-2-211
R134	47 Ω, 5%, 1/4 W, Metal Film	011-104-5-470
R135, 235	300 Ω, 5%, 1/4 W, Metal Film	011-104-5-301
R136, 236	10 Ω, 5%, 1/4 W, Metal Film	011-104-5-100
VR101, 102, 201, 202	20 kΩ, Trimmer Pot	010-100-9-001

CAPACITORS

C101, 201	0.047 µF, 10%, 400 V, Polyester	025-278-9-004
C104, 204	2200 pF, 20%, 125 V, AC Ceramic	020-448-9-002
C105, 205	22 pF, 5%, 50 V, Ceramic	020-423-9-010
C107, 117, 124, 207, 217, 224	0.1 µF, +80/–20%, 50 V	020-480-9-001
C108, 113, 118, 208, 213, 218	0.022 µF, +80/–20%, 50 V, Ceramic	020-423-9-034
C109, 110, 209, 210	0.01 µF, +80/–20%, 50 V, Ceramic	020-448-9-
C112, 119, 212, 219	10 uF, 20%, 50 V, Electrolytic	022-441-9-
C114, 214	100 pF, 5%, 50 V, Ceramic	020-423-9-
C116, 121	47 pF, 5%, 50 V, Ceramic	020-423-9-
C216	15 pF, 5%, 50 V, Ceramic	020-423-9-
C220	0.0033 µF, 5%, 50 V, Polyester	025-320-9-
VC122, 222	50 pF Trimmer	028-113-9-

DIODES & TRANSISTORS

ZD101, 201	6.8 V, 500m W, Zener Diode	152-180-9-
Q101, 105, 201, 205	2SC1907 NPN Transistor	176-174-9-
Q103, 203	2SC1815Y NPN Transistor	176-089-9-
Q104, 204	2SA844D PNP Transistor	177-021-9-
Q102, 202	2SK168E FET	182-113-9-

INTEGRATED CIRCUITS

U101, 201	I.C., LF411CN	307-338-9-
U102, 202	I.C., 733CN	307-189-9-

MISCELLANEOUS

S101, 201	Lever Switch	080-030-9-
S102, 202	Rotary Switch & 2 kΩ, Pot with Sw. Ass'y	083-341-9-
	Shield, Top	256-318-9-
	Shield, Bottom Ch 1	256-318-9-
	Shield, Bottom Ch 2	256-318-9-
J13, 14, 15, 16, 17, 18, 19, 20	Jumper Wire	---
J1, 2, 4, 5, 6, 7, 8, 9, 10, 12	Jumper Wire	---
J22, 25	Jumper Wire	---
J11	Jumper Wire	---

VERTICAL AMP & CONTROL PCB ASSEMBLY (546-065-9-003)

RESISTORS

R303, 304, 314, 315, 324, 334, 325, 412, 413	2.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-222
R305, 306	100 Ω, 5%, 1/4 W, Metal Film	011-104-5-101
R307, 308, 319, 320, 407, 408	470 Ω, 5%, 1/4 W, Metal Film	011-104-5-471
R309, 321	51 kΩ, 5%, 1/4 W, Metal Film	011-104-5-513
R310, 322, 327, 359, 910	220 Ω, 5%, 1/4 W, Metal Film	011-104-5-221
R311, 312	1.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-122
R317, 318, 323, 352, 353, 355, 356, 369, 404, 405, 410, 411, 907	51 Ω, 5%, 1/4 W, Metal Film	011-104-5-510
R326, 370, 925	6.8 Ω, 5%, 1/4 W, Metal Film	011-104-5-689
R328, 329	8.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-822
R330, 331	12 kΩ, 5%, 1/4 W, Metal Film	011-104-5-123
R332, 333, 421	33 kΩ, 5%, 1/4 W, Metal Film	011-104-5-333
R335, 337, 368	47 kΩ, 5%, 1/4 W, Metal Film	011-104-5-473
R336, 366, 367	22 kΩ, 5%, 1/4 W, Metal Film	011-104-5-223
R338, 340	1 kΩ, 5%, 1/4 W, Metal Film	011-104-5-102
R339, 342	15 kΩ, 5%, 1/4 W, Metal Film	011-104-5-153
R341, 362, 363, 364, 365, 428	10 kΩ, 5%, 1/4 W, Metal Film	011-104-5-103
R343, 361	1 Ω, 5%, 1/4 W, Metal Film	011-104-5-109
R344, 345, 346, 347	150 Ω, 5%, 1/4 W, Metal Film	011-104-5-151
R348, 349, 350, 351	330 Ω, 5%, 1/4 W, Metal Film	011-104-5-331
R354, 401, 402, 418, 419	68 Ω, 5%, 1/4 W, Metal Film	011-104-5-680
R357, 358	4.7 kΩ, 5%, 1/4 W, Metal Film	011-104-5-472
R403, 406	2.4 kΩ, 5%, 1/4 W, Metal Film	011-104-5-242
R414	33 Ω, 5%, 1/4 W, Metal Film	011-104-5-330
R415	390 Ω, 5%, 1/2 W, Metal Film	011-102-5-391
R416, 417, 425, 426	10 Ω, 5%, 1/4 W, Metal Film	011-104-5-100
R420	39 kΩ, 5%, 1/4 W, Metal Film	011-104-5-393
R422	15 Ω, 5%, 1/4 W, Metal Film	011-104-5-150
R423, 424	2.4 kΩ, 5%, 5 W, Metal Oxide	013-139-9-004
R519	1 Ω, 5%, 1/2 W, Metal Film	011-102-5-109
R610	27 kΩ, 5%, 1/4 W, Metal Film	011-104-5
R908	750 Ω, 5%, 1/4 W, Metal Film	011-104-5
R909	820 Ω, 5%, 1/4 W, Metal Film	011-104-5
R911	270 Ω, 5%, 1/4 W, Metal Film	011-104-5
SH401	Thermistor	005-024-9
VR301, 302	3 kΩ, Trimmer Pot	010-100-9
VR305, 306	300 Ω, Trimmer Pot	010-073-9
VR307, 308, 902	500 Ω, Trimmer Pot	010-073-9
VR309, 310, 311	1 kΩ, Trimmer Pot	010-073-9
VR401	100 Ω, Trimmer Pot	010-073-9

CAPACITORS

C301, 302	270 pF, 5%, 50 V, Ceramic	020-423-
C303	8 pF, ±0.5 pF, 50 V, Ceramic	020-423-
C304	18 pF, 5%, 50 V, Ceramic	020-423-
C304A	4 pF, ±0.25 pF, 50 V, Ceramic	020-444-
C305, 308, 313, 314, 316, 401	0.022 µF, +80/–20%, 50 V, Ceramic	020-423-
C306, 307, 312, 315 317, 402	10 µF, 20%, 50 V, Electrolytic	022-441-
C309, 404	10 pF, ±0.5 pF, 50 V, Ceramic	020-423-
C310	22 pF, 5%, 50 V, Ceramic	020-423-
C311	470 pF, 5%, 50 V, Ceramic	020-423-
C403	0.0047 µF, 5%, 50 V, Polyester	025-278-
C405	120 pF, 5%, 50 V, Ceramic	020-423-
C407	0.047 µF, 10%, 250 V, Polyester	025-278-
C506, 508	1000 µF, 20%, 35 V, Electrolytic	022-441
C507	1000 µF, 20%, 25 V, Electrolytic	022-441
C900	33 pF, 5%, 50 V, Ceramic	020-423
C904	0.01 µF, 5%, 50 V, Polyester	025-278
VC401	50 pF Trimmer	028-113

DIODES & TRANSISTORS

BD503, 504, 505	Bridge Rectifier	157-045
D301 - 322	1N4148 Silicon Diode	151-038
Q301, 302, 303, 304, 401, 402, 403, 404	2SC1906 NPN Transistor	176-21
Q305, 306, 901	2SC1815Y NPN Transistor	176-08

VERTICAL AMP & CONTROL PCB ASSEMBLY (Continued)

DIODES & TRANSISTORS (Continued)

RCUIT MBOL	DESCRIPTION	B+K PRECISION PART NUMBER
07, 312, 313	2SA1015Y PNP Transistor	177-043-9-002
08, 309, 310, 311	2SA1029C PNP Transistor	177-108-9-003
05, 406	BF458 NPN Transistor	176-214-9-001
02	2N3906 PNP Transistor	177-035-9-001
901	9.1V, 500m W, Zener Diode	152-115-9-002

INTEGRATED CIRCUITS

01	I.C., 4013B	308-377-9-001
02	I.C., 4011B	308-114-9-001
02	I.C., 7812 1A, 12 V, Regulator	307-164-9-001
03	I.C., 7805 1A, 5 V, Regulator	307-080-9-001
04	I.C., 7824 1A, 24 V, Regulator	307-456-9-001

MISCELLANEOUS

01, 402	12 µHy Peaking Coil	047-067-9-002
01	Pushbutton Switch, 1-Station	088-175-9-001
02, 303, 304	Pushbutton Switch, 3-Station	088-175-9-002
Board	303-295-9-003	
(For Q405, 406)	Ceramic Insulator (Washer)	342-137-9-003
(For U502) (For Q405, 406)	Insulator	342-191-9-001
(For U504)	M3 x 6 mm Screw	634-228-9-001
(For Q405, 406)	M3 x 12 mm Screw	634-228-9-004
(For U503)	M3 x 6 mm Screw	634-228-9-010
(For U502)	M3 x 12 mm Plastic Screw	634-259-9-001
(For Q405, 406)	M3 Nut	653-117-9-004
(For Q405, 406)	M3 x 7 mm Washer	724-092-9-004
(For Q405, 406)	Heat Sink	747-160-9-001
(For U503)	Heat Sink	747-160-9-005
(For U502, 504)	Heat Sink	747-160-9-006
PG301	6-Pin Polarized Plug, Large	757-140-9-005
PG317, Y+, Y-	2-Pin Polarized Plug, Small	757-140-9-006
PG303, 305, 306	3-Pin Polarized Plug, Small	757-140-9-007
PG302	5-Pin Polarized Plug, Small	757-140-9-009
PG304	7-Pin Polarized Plug, Small	757-140-9-011
PG308, 309	6-Pin Polarized Plug, Small 90°	757-140-9-013
J18	Jumper Wire	- - -

TIMEBASE / CALIBRATOR P.C. BOARD ASSEMBLY (546-065-9-001)

RESISTORS

00	3.3 kΩ, 5%, 1/4 W, Metal Film	011-104-5-332
01,802,804,814	51 Ω, 5%, 1/4 W, Metal Film	011-104-5-510
03	12 kΩ, 5%, 1/4 W, Metal Film	011-104-5-123
06	1.8 kΩ, 5%, 1/4 W, Metal Film	011-104-5-182
07,816	1 kΩ, 5%, 1/4 W, Metal Film	011-104-5-102
08	23.2 kΩ, 1/2%, 1/4 W, Metal Film	017-144-2-322
09	45.3 kΩ, 1/2%, 1/4 W, Metal Film	017-144-4-532
10	100 kΩ, 1/2%, 1/4 W, Metal Film	017-144-1-003
11	249 kΩ, 1/2%, 1/4 W, Metal Film	017-144-2-493
12	390 kΩ, 5%, 1/4 W, Metal Film	011-104-5-394
13	820 kΩ, 5%, 1/4 W, Metal Film	011-104-5-824
15,822	100 kΩ, 5%, 1/4 W, Metal Film	011-104-5-104
17	150 kΩ, 1%, 1/4 W, Metal Film	015-144-1-503
19	51 kΩ, 5%, 1/4 W, Metal Film	011-104-5-513
20,838,841,904	6.8 Ω, 5%, 1/4 W, Metal Film	011-104-5-689
21	180 Ω, 5%, 1/4 W, Metal Film	011-104-5-181
40	5.6 kΩ, 5%, 1/4 W, Metal Film	011-104-5-562
42	470 Ω, 5%, 1/4 W, Metal Film	011-104-5-471
43	2.00 kΩ, 1/2%, 1/4 W, Metal Film	017-144-2-001
44	5.11 kΩ, 1/2%, 1/4 W, Metal Film	017-144-5-111
45	1.00 kΩ, 1/2%, 1/4 W, Metal Film	017-144-1-001
46	4.00 kΩ, 1/2%, 1/4 W, Metal Film	013-183-9-001
47	68 kΩ, 5%, 1/4 W, Metal Film	011-104-5-683
48	Jumper Wire	
49,850,851,836A, 37A	10 kΩ, 5%, 1/4 W, Metal Film	011-104-5-103
01	270 Ω, 5%, 1/4 W, Metal Film	011-104-5-271
02,903	15 kΩ, 5%, 1/4 W, Metal Film	011-104-5-153
05	39 kΩ, 5%, 1/4 W, Metal Film	011-104-5-393
06	27 kΩ, 5%, 1/4 W, Metal Film	011-104-5-273
303,804,805,806	20 kΩ Trimmer Pot.	010-100-9-001
307	50 kΩ, Trimmer Pot.	010-100-9-002
308	200 kΩ, Trimmer Pot.	010-100-9-003
901	200 Ω, Trimmer Pot.	010-100-9-004

CAPACITORS

C801,802,812,821	0.022 µF, +80/–20% 50 V, Ceramic	020-423-9-034
C805,813,901	10 µF, 20% 50 V, Electrolytic	022-441-9-002
C807	68 pF, 5% 50 V, Ceramic	020-423-9-018
C809	0.001 µF, 10% 50 V, Ceramic	020-423-9-029
C810	0.1 µF, +80/–20% 50V	020-480-9-001
C811	4.7 µF, 20% 50 V, Electrolytic	022-441-9-001
C814	22 µF, 20% 50 V, Electrolytic	022-441-9-003
C815,820	47 µF, 10% Tantalum	027-120-9-001
C816	1 µF, 10%, 25 V, Tantalum	027-103-9-001
C817	0.012 µF, 5% 50 V, Polyester	025-294-9-005
C818	0.33 µF, 10%, 35 V, Tantalum	027-092-9-004
C819	100 pF, 5% 50 V, Ceramic	020-423-9-003
C902	0.001 µF, 5% 50 V, Polyester	025-320-9-001
C903	0.01 µF, 5% 50 V, Polyester	025-278-9-006

DIODES & TRANSISTORS

D801,804,805,806, 807,813,814,815,816	1N4148 Silicon Diode	151-038-9-001
D808,809,810,811, 812,817,818	FDH333 Diode	151-150-9-001
Q801,802,805	2SC1815-Y NPN Transistor	176-089-9-003
Q803	2N2369 NPN Transistor	176-049-9-001
Q804	BC557B PNP Transistor	177-105-9-003

INTEGRATED CIRCUITS

U801	I.C., 4028B	308-320-9-001
U802,803	I.C., 4052B	308-434-9-001
U901	I.C., 4011B	308-114-9-001

MISCELLANEOUS

J1,2,3,4,5,6,7,8,9, 11,12,13,14,15, 16,17,18,19,20	Jumper Wire	- - -
P802	3-Pin Polarized Plug (Small)	757-140-9-007
P803	7-Pin Polarized Plug (Small)	757-140-9-011
P805	2-Pin Polarized Plug (Small)	757-140-9-006
S801	Rotary Switch, 19 Position	083-339-9-001

HORIZONTAL SWEEP PCB ASSEMBLY (546-065-9-004)

RESISTORS

02, 503, 510, 602, 633, 670, 831	4.7 kΩ, 5%, 1/4 W, Metal Film	011-104-5-472
04	100 Ω, 5%, 1/2 W, Metal Film	011-102-5-101
05, 515, 542	510 Ω, 5%, 1/4 W, Metal Film	011-104-5-511
06	47 kΩ, 5%, 1/2 W, Carbon Film	002-102-5-473
07, 509	100 kΩ, 5%, 1/2 W, Carbon Film	002-102-5-104
08	120 kΩ, 5%, 1/2 W, Carbon Film	002-102-5-124
11	33 Ω, 5%, 1/2 W, Metal Film	011-102-5-330
12, 516	22 kΩ, 5%, 1/2 W, Metal Film	011-102-5-223
13, 546	820 kΩ, 5%, 1/2 W, Carbon Film	002-102-5-824
R514	12.1 kΩ, 1%, 1/4 W, Metal Film	015-144-1-212
R517	390 kΩ, 5%, 1/2 W, Carbon Film	002-102-5-394
R518	39 kΩ, 5%, 1/4 W, Metal Film	011-104-5-393
R520, 643	2.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-222
R521, 533, 535, 650, 651, 659, 664, 826	51 Ω, 5%, 1/4 W, Metal Film	011-104-5-510
R522, 626, 668	100 Ω, 5%, 1/4 W, Metal Film	011-104-5-101
R525, 531, 532, 537, 609, 621, 623, 631, 640, 642, 825, 830	10 kΩ, 5%, 1/4 W, Metal Film	011-104-5-103
R526, 527, 528	1.8 MΩ, 5%, 1/2 W, Metal Film	011-102-5-185
R529	1 MΩ, 5%, 1/2 W, Metal Film	011-102-5-105

HORIZONTAL SWEEP PCB ASSEMBLY (Continued)

RESISTORS (Continued)

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
R530, 613, 618	1.5 MΩ, 5%, 1/4 W, Metal Film	011-104-5-155*
R534, 634	220 kΩ, 5%, 1/4 W, Metal Film	011-104-5-224
R536, 614	120 kΩ, 5%, 1/4 W, Metal Film	011-104-5-124
R538	56 kΩ, 5%, 1/4 W, Metal Film	011-104-5-563
R539, 603, 604, 606, 622, 630, 641	100 kΩ, 5%, 1/4 W, Metal Film	011-104-5-104
R540	560 Ω, 5%, 1/2 W, Metal Film	011-102-5-561
R541	150 Ω, 5%, 1/4 W, Metal Film	011-104-5-151
R543	390 kΩ, 5%, 1/4 W, Metal Film	011-104-5-394
R544	10.0 kΩ, 1%, 1/4 W, Metal Film	015-144-1-002
R544A	120 Ω, 5%, 1/4 W, Metal Film	011-104-5-121
R545	6.8 MΩ, 5%, 1/2 W, Metal Glaze	013-139-9-001
R546A	680 kΩ, 5%, 1/2 W, Carbon Film	002-102-5-684
R547	71.5 kΩ, 1%, 1/4 W, Metal Film	015-144-7-152
R548	18.2 kΩ, 1%, 1/4 W, Metal Film	015-144-1-822
R549	33 Ω, 5%, 1 W, Fusible	013-181-9-001
R550	330 Ω, 5%, 1/4 W, Metal Film	011-104-5-331
R601	1.2 kΩ, 5%, 1/2 W, Metal Film	011-102-5-122
R605, 607, 619, 620, 632, 646, 649, 671	1 kΩ, 5%, 1/4 W, Metal Film	011-104-5-102
R608, 616, 617	2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-202
R611, 638	8.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-822
R615	510 kΩ, 5%, 1/4 W, Metal Film	011-104-5-514
R624, 629, 667, 824	6.8 Ω, 5%, 1/4 W, Metal Film	011-104-5-689
R625	220 Ω, 5%, 1/4 W, Metal Film	011-104-5-221
R627	82 Ω, 5%, 1 W, Carbon Film	002-001-5-820
R628, 637, 655	470 Ω, 5%, 1/4 W, Metal Film	011-104-5-471
R635, 636, 644, 672	1.5 kΩ, 5%, 1/4 W, Metal Film	011-104-5-152
R639, 823, 829	2.7 kΩ, 5%, 1/4 W, Metal Film	011-104-5-272
R645	22 kΩ, 5%, 1/4 W, Metal Film	011-104-5-223
R647, 648	33 Ω, 5%, 1/4 W, Metal Film	011-104-5-330
R652, 840	3.3 kΩ, 5%, 1/4 W, Metal Film	011-104-5-332
R653, 654, 665	1.2 kΩ, 5%, 1/4 W, Metal Film	011-104-5-122
R656, 657	5.1 kΩ, 5%, 1/4 W, Metal Film	011-104-5-512
R658	51 Ω, 5% 1/4 W, Carbon Film	002-104-5-510
R660, 661	12 kΩ, 5%, 1/4 W, Metal Film	011-104-5-123
R662, 663	3.9 kΩ, 5%, 1/4 W, Metal Film	011-104-5-392
R669	47 kΩ, 5%, 1/4 W, Metal Film	011-104-5-473
R827	62 kΩ, 5%, 1/4 W, Metal Film	011-104-5-623
R832, 834	68 Ω, 5%, 1/4 W, Metal Film	011-104-5-680
R833	180 Ω, 5%, 1/4 W, Metal Film	011-104-5-181
R835, 836	392 Ω, 1%, 1/4 W, Metal Film	015-144-3-920
R837	100 Ω, 1%, 1/4 W, Metal Film	015-144-1-000
R838, 839	15 kΩ, 5%, 3 W, Metal Film	013-139-9-005
VR501, 502, 804	5 kΩ, Trimmer Pot.	010-046-9-008
VR503, 506	500 kΩ, Potentiometer	008-877-9-003
VR504, 505	500 kΩ, Trimmer Pot.	010-046-9-010
VR507, 606	50 kΩ, Trimmer Pot.	010-046-9-009
VR508, 601	30 kΩ, Trimmer Pot.	010-046-9-007
VR602	1 MΩ, Trimmer Pot.	010-046-9-005
VR603, 803	10 kΩ, Pot. with Switch	008-877-9-001
VR604	5 kΩ, Trimmer Pot.	010-046-9-001
ALT VR604	5 kΩ, Trimmer Pot.	010-100-9-006
VR605	300 Ω, Trimmer Pot.	010-046-9-006
VR805	100 Ω, Trimmer Pot.	010-046-9-004

CAPACITORS

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
C501, 526, 608, 615, 625, 823	10 µF, 20%, 50 V, Electrolytic	022-441-9-002
C502, 517, 522, 523, 614	0.1 µF, 5%, 100 V, Polyester	025-278-9-016
C503, 504	47 µF, +50/–20%, 250 V, Electrolytic	022-381-9-005
C505, 610	0.001 µF, 10%, 50 V, Ceramic	020-423-9-029
C510, 633	120 pF, 5%, 50 V, Ceramic	020-423-9-004
C511, 512	0.22 µF, 10%, 1k V, Polyester	025-278-9-005
C513	0.033 µF, 10%, 250 V, Polyester	025-300-9-001
C514, 515, 516	68 pF, 10%, 2k V, Ceramic	020-423-9-028
C518	0.047 µF, 10%, 400 V, Polyester	025-320-9-003
C519, 520, 528	0.0047 µF, +80/–20%, 2k V, Ceramic	020-423-9-032
C521	100 µF, 20%, 50 V, Electrolytic	022-441-9-006
C524, 620	10 µF, 20%, 50 V, Electrolytic	020-441-9-
C525, 527, 609, 621, 624, 626, 814, 815, 816	.022 µF, +80/–20%, 50 V, Ceramic	020-423-9-
C526A	22 µF, 20%, 50 V, Electrolytic	022-441-9-
C529	100 pF, 10%, 2k V, Ceramic	020-423-9-
C530, 531	0.01 µF, +80/–20%, 1.5k V, Ceramic	020-423-9-
C601	270 pF, 5%, 50v Ceramic	020-423-9-
C603, 604, 613, 622	1 µF, 20%, 50 V, Electrolytic	022-441-9-
C605, 606, 630	0.01 µF, 10%, 50 V, Ceramic	020-453-9-
C607	0.047 µF, 5%, 50 V, Polyester	025-278-9-
C611, 612	6.8 pF, ±0.5 pF, 50 V, Ceramic	020-423-9-
C618	100 pF, 5%, 50 V, Ceramic	020-423-9-
C619	1 µF, 20%, 50 V, Non-Polar Electrolytic	022-381-9-
C623	330 pF, 5%, 50 V, Ceramic	020-423-9-
C629	0.0022 µF, 10%, 50 V, Ceramic	020-423-9-
C817	0.0068 µF, 5%, 50 V, Polyester	025-278-9-
C818, 822	390 pF, 5%, 50 V, Ceramic	020-423-9-
C820	0.047 µF, 10%, 250 V, Polyester	025-278-9-
C821	0.15 µF, 5%, 50 V, Polyester	025-278-9-

INDUCTORS & TRANSFORMERS

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
L801, 802	680 µHy Peaking Coil	047-067-9-
T502	CVT Transformer	063-021-9-

SWITCHES

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
S601, 602	Lever Switch	080-030-9-
S603, 606	Push Button Switch	088-175-9-

DIODES & TRANSISTORS

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
BD501, 502	Bridge Rectifier	157-045-9
D501, 502, 504,	1N4007 (1A, 1000V) Silicon Diode	151-053-9
D503, 505, 506, 507, 514, 601, 602, 603, 604, 605, 606, 607, 608, 609, 803	1N4148 Silicon Diode	151-038-9
D511, 512	R5000 Diode	151-176-9
Q501	BF459 NPN Transistor	176-214-9
Q502, 504	BF423 PNP Transistor	177-108-9
Q505	2SA1015-Y PNP Transistor	177-043-9
Q507, 601, 602, 603, 604, 611, 806, 807	2SC1815-Y NPN Transistor	176-089-9
Q508	2SA1029C PNP Transistor	177-108-9
Q509	2SC535C NPN Transistor	176-055-9
Q510	BF422 NPN Transistor	176-214-9
Q605	BC557B PNP Transistor	177-105-9
Q606, 607	BF450 PNP Transistor	177-108-9
Q608, 609, 610	BF199 NPN Transistor	176-214-9
Q808, 809	BF458 NPN Transistor	176-214-9
ZD501	33 V, 500m W, Zener Diode	152-180-9
ZD502	1N4764A (100 V, 5%, 1 W) Zener Diode	152-180-9
ZD503	12V, 500m W, Zener Diode	152-197-9
ZD506, 601	5.6 V, 500 m W, Zener Diode	152-180-9

INTEGRATED CIRCUITS

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
U501	I.C., TL431C	307-409-
U505	4N25 Photo diode	158-094-
U506	I.C., 308.	307-423-
U601	I.C., 710 (14 Pin)	307-466-
U602	I.C., 7812 1A, 12 V, Regulator	307-164-
U603	I.C., 74LS74	307-119-

MISCELLANEOUS

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
H.V. CKT	Shield, High Voltage (Top)	256-318
H.V. CKT	Shield Plate (Bottom).	256-318
for H.V. Transformer	Shield, Copper Strap	256-318
(For Q808, 809,)	Ceramic Insulator (Washer).	342-137
(For Q808, 809,)	Insulator	342-191
(For Q501)	Insulator	342-191
For C503, 504	Cable Tie.	380-311
(For Q501)	M3 x 8mm Screw	634-228
(For Q808, 809,)	M3 x 10mm Screw	634-228
(For Q501)	Heat Sink	747-160
(For Q808, 809,)	Heat Sink	747-160
TP-2kV, +260V, +140V	PCB Test Pin	757-140

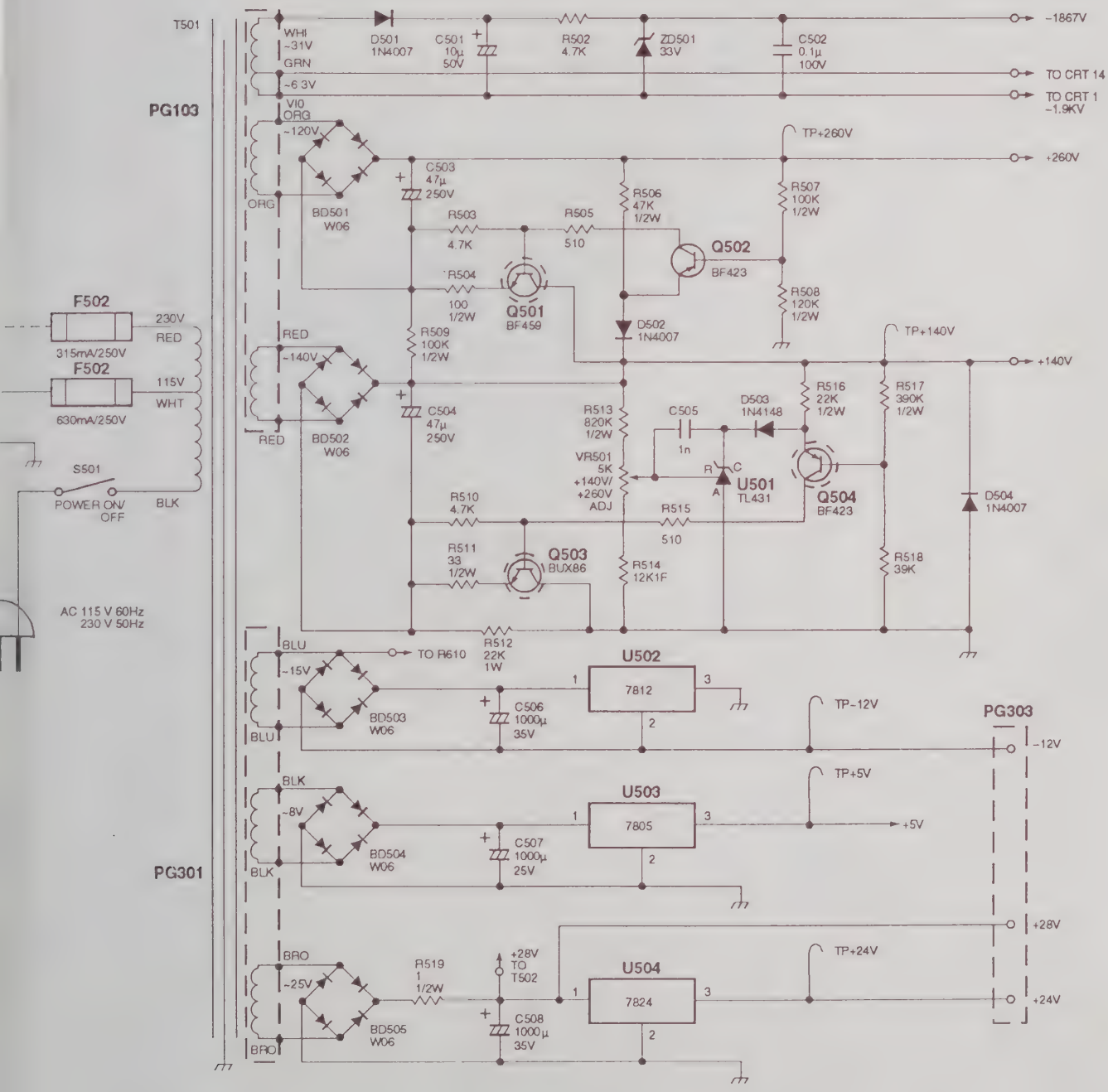
RCUIT MBOL	DESCRIPTION	B+K PRECISION PART NUMBER
+12V, +5V, +24V, 12V,	PCB Test Pin	757-140-9-001
103	4-Pin Polarized Plug (Large)	757-140-9-003
104	5-Pin Polarized Plug (Large)	757-140-9-004
111, 511	3-Pin Polarized Plug (Small)	757-140-9-007

HORIZONTAL SWEEP PCB ASSEMBLY (Continued)

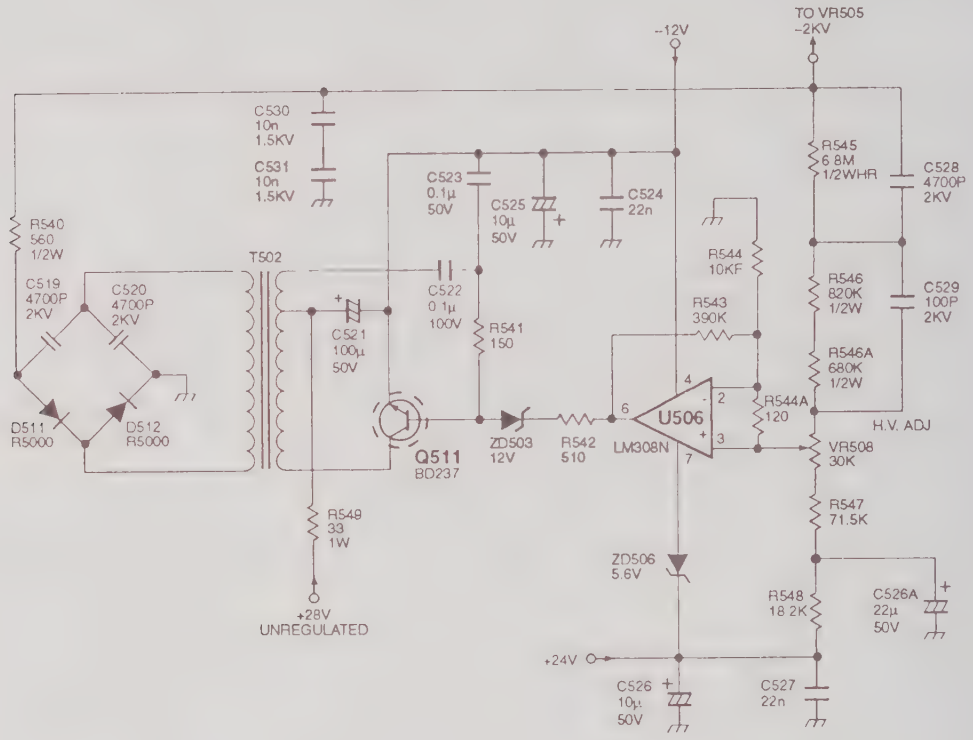
MISCELLANEOUS (Continued)

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
PG102	4-Pin Polarized Plug (Small)	757-140-9-008
PG110	2-Pin Polarized Plug (Small)	757-140-9-012
PG106	4-Pin Polarized Plug (Large)	757-140-9-015
PG105	3-Pin Polarized Plug (Large)	757-140-9-016
J26	Jumper Wire	---

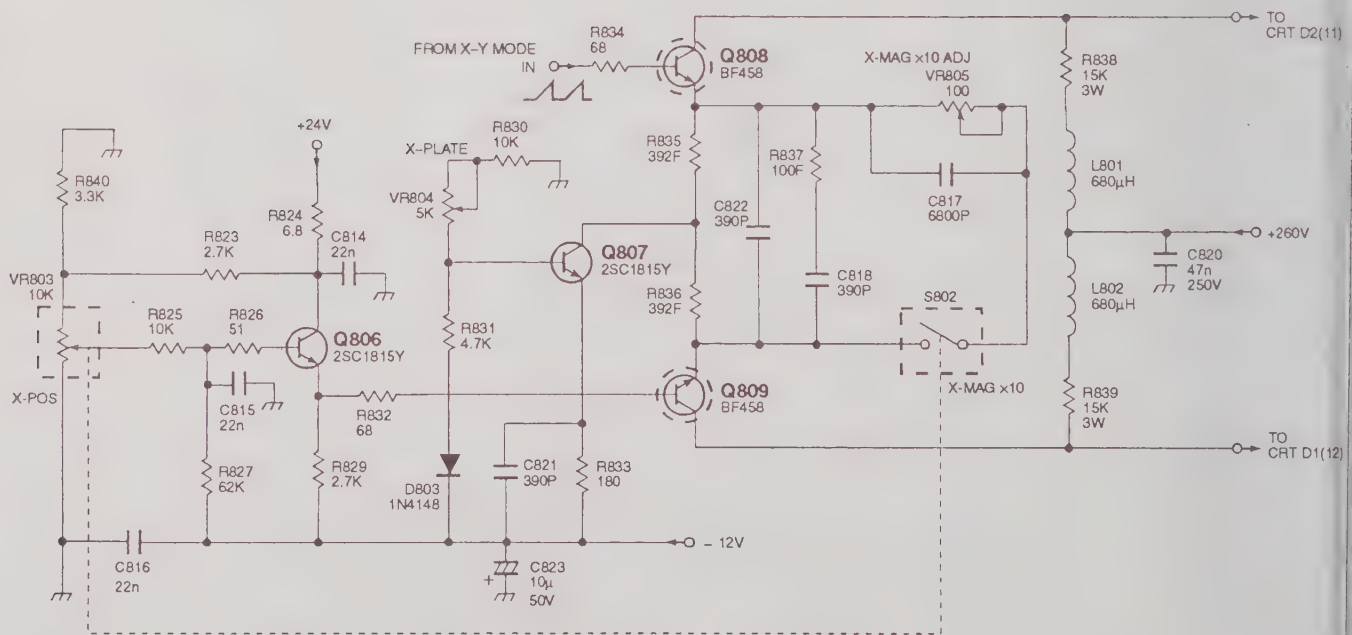
POWER SUPPLY



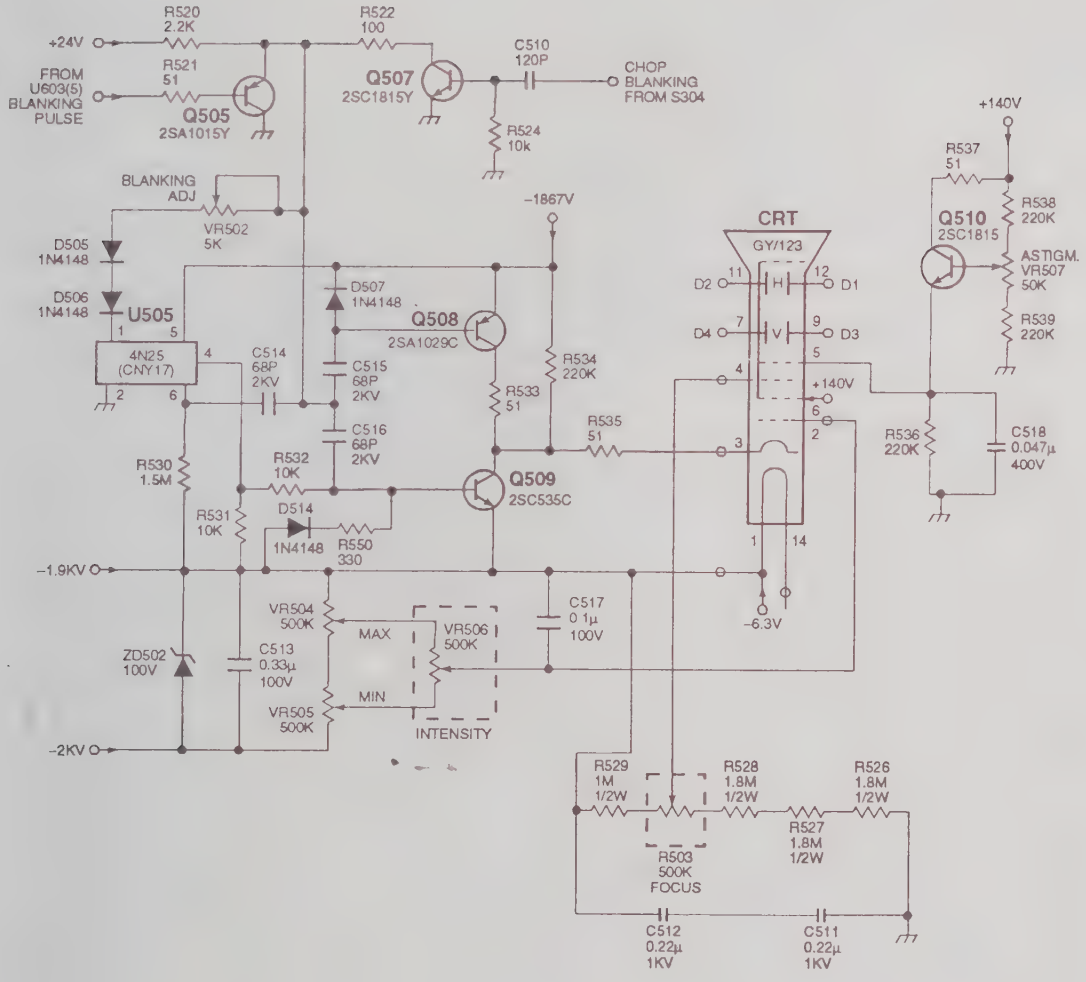
H.V. GENERATOR

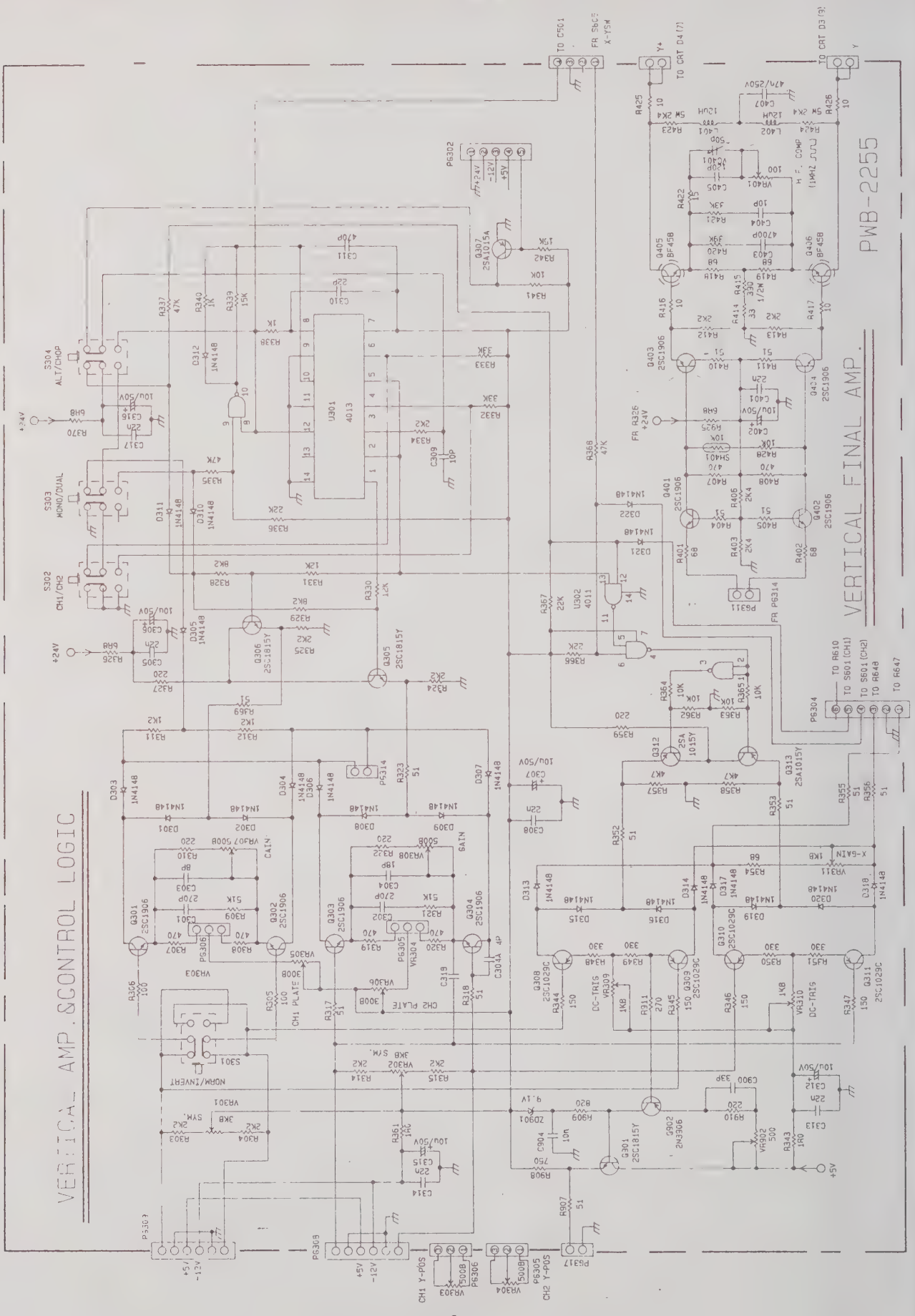


HORIZONTAL FINAL AMP.

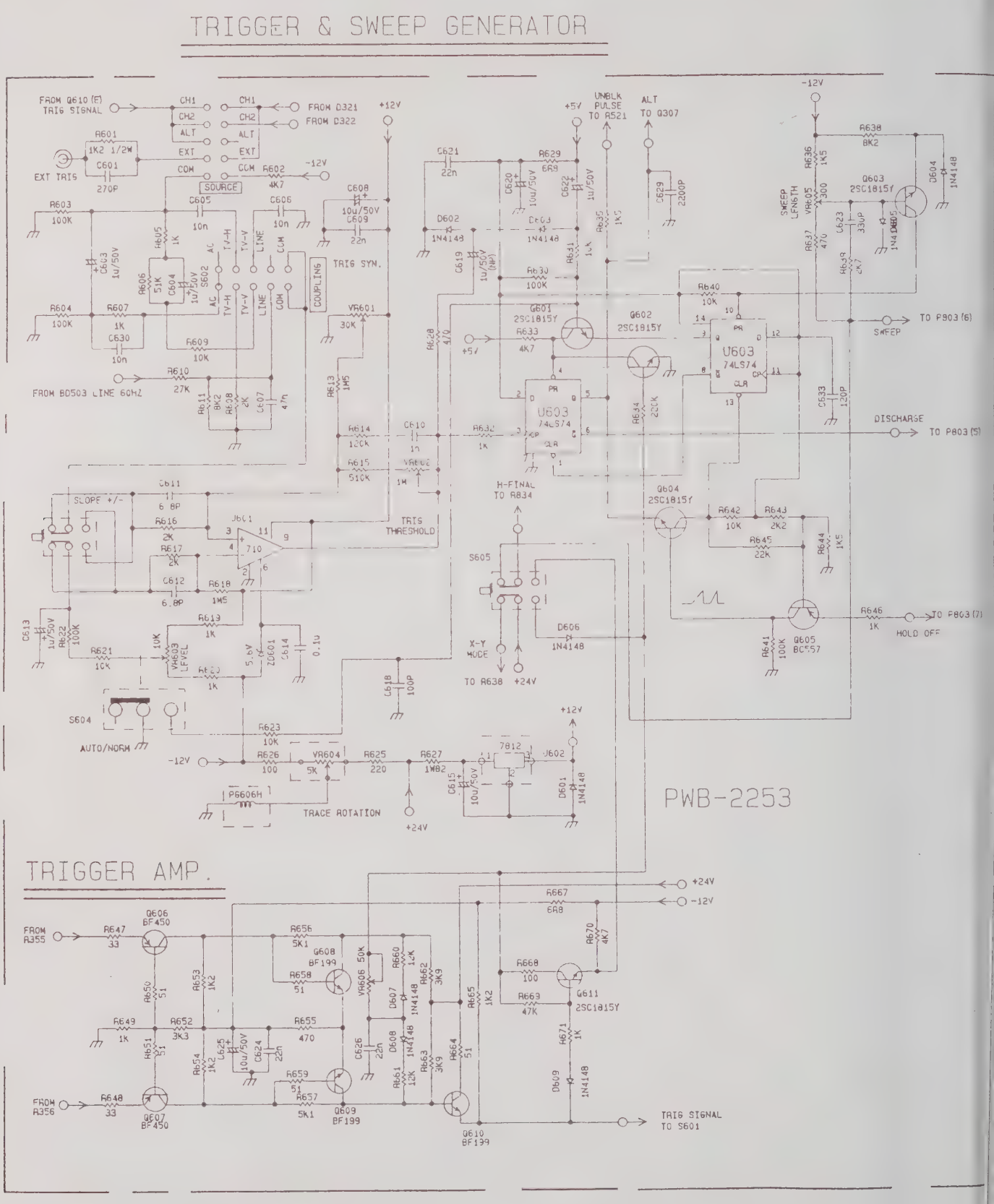


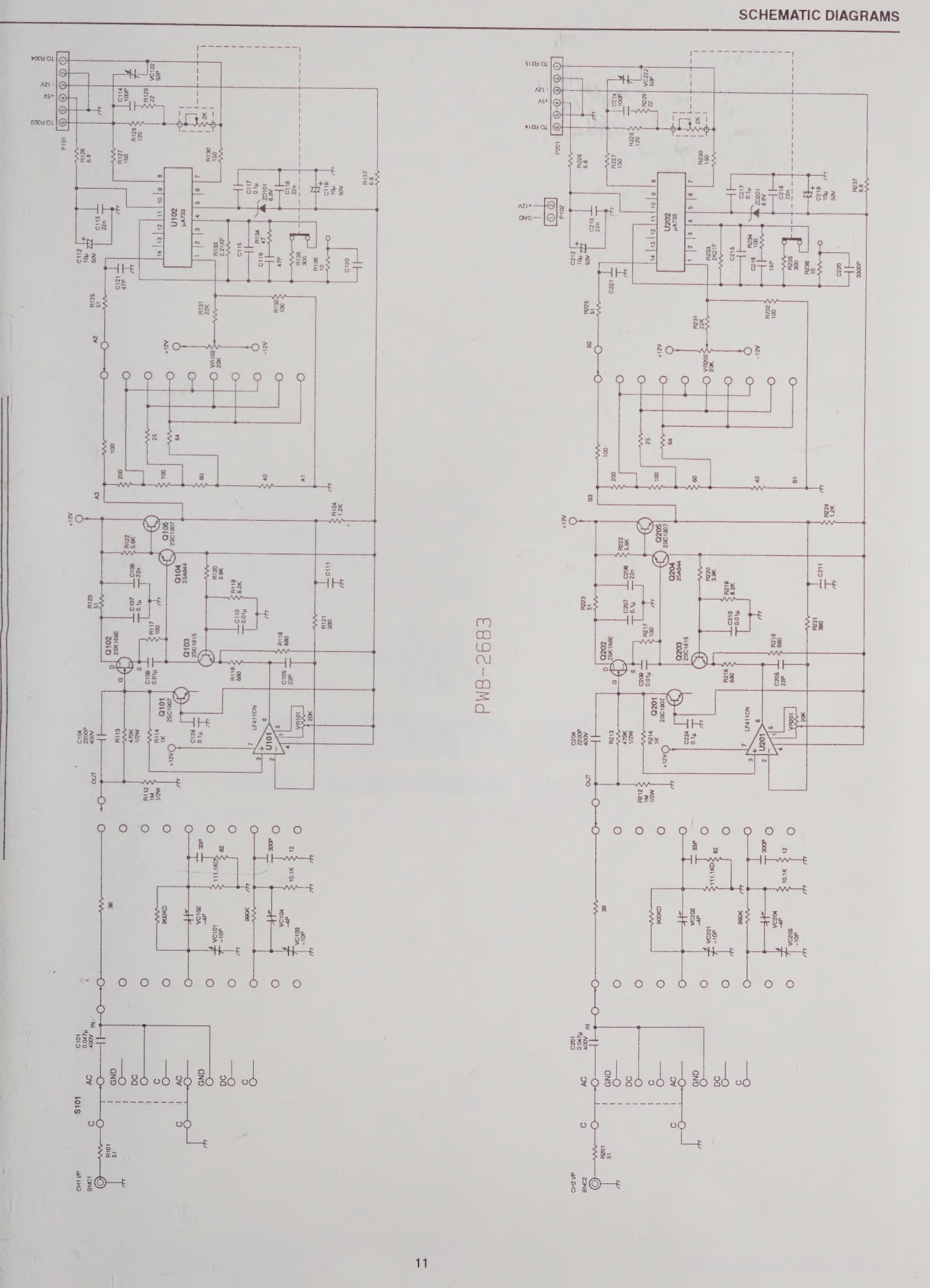
CRT CONTROL


R520
2.2K
+24V
R522
100
C510
120P
CHOP
BLANKING
FROM S304
FROM
U603(5)
BLANKING
PULSE
R521
51
Q505
2SA1015Y
Q507
2SC1815Y
R524
10k
+140V
R537
51
R538
220K
Q510
2SC1815
ASTIGM.
VR507
50K
R539
220K
BLANKING
ADJ
VR502
5K
-1867V
CRT
GY/123
D505
1N4148
D506
1N4148
U505
4N25
(CNY17)
D507
1N4148
Q508
2SA1029C
C514
68P
2KV
C515
68P
2KV
C516
68P
2KV
R534
220K
R533
51
R535
51
D2
D1
D4
D3
+140V
R536
220K
C518
0.047µ
400V
R530
1.5M
R532
10K
R531
10K
D514
1N4148
R550
330
Q509
2SC535C
-1.9KV
-6.3V
VR504
500K
MAX
VR506
500K
C517
0.1µ
100V
ZD502
100V
C513
0.33µ
100V
MIN
VR505
500K
INTENSITY
-2KV
R529
1M
1/2W
R528
1.8M
1/2W
R526
1.8M
1/2W
R527
1.8M
1/2W
R503
500K
FOCUS
C512
0.22µ
1KV
C511
0.22µ
1KV


VERTICAL AMP. &CONTROL LOGIC
VERTICAL FINAL AMP.
PWB-2255

CALIBRATOR
MAIN PCB ASS'Y
PWB-2641
VAR CONTROL
5K
S3 S2 S1
MC14052BCP
1N4148
2SC1815
2N2369
1KHZ
0.2V
+5V
+12V
+24V
EXT
JK-2
LED801
U901
4011
U801
C40208
U802
U803


TRIGGER & SWEEP GENERATOR
FROM Q610 (E) TRIG SIGNAL
EXT TRIG
FROM D321
FROM D322
SOURCE
TRIG SYN.
COUPLING
FROM BD503 LINE 60HZ
SLOPE +/-
TRIG THRESHOLD
AUTO/NORM
TRACE ROTATION
H-FINAL TO R834
X-Y MODE
TO R638 +24V
DISCHARGE
TO P803 (5)
SWEEP
TO P803 (6)
HOLD OFF
TO P803 (7)
U603 74LS74
U604 7812
Q601 2SC1815Y
Q602 2SC1815Y
Q603 2SC1815Y
Q604 2SC1815Y
Q605 BC557
PWB-2253
TRIGGER AMP.
FROM R355
FROM R356
Q606 BF450
Q607 BF450
Q608 BF199
Q609 BF199
Q610 BF199
Q611 2SC1815Y
TRIG SIGNAL TO S601


PWB-2683

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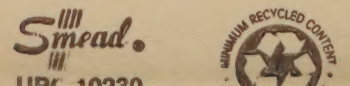
Smead
MINIMUM RECYCLED CONTENT

MP MASTER
MA34938